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HEALTH INFORMATION TECHNOLOGY

Factors Related to Public Health Data Sharing between Local and State Health Departments

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Objective. Public health organizations increasingly face the need to be able to share data among themselves and ultimately with other providers. We examined what factors contribute to public health organizations' data exchange capabilities.

Data Sources. National Association of County and City Health Officials' 2008 National Profile of Local Health Departments survey was linked to the Association of State and Territorial Health Official's 2007 Profile of State Public Health Survey.

Study Design. We conducted a cross-sectional analysis of organizational factors associated with gaps in data sharing between state health agencies (SHAs) and local health departments (LHDs) in the areas of childhood immunizations, vital records, and reportable conditions.

Data Collection. Based on reported information system (IS) capabilities, we created a binary variable that measured whether bidirectional data sharing was structurally possible between an LHD and its respective SHA.

Principal Findings. The proportion of LHDs experiencing a data sharing gap was 34.0 percent for immunizations, 69.8 percent for vital records, and 81.8 percent for reportable conditions. Increased SHA technological capacity and size reduced the odds of gaps.

Conclusions. Improving the IS capabilities of public health agencies may be the key to their remaining relevant in the currently evolving health care system.

Key Words. Public health, public health informatics, organization and administration, public health surveillance, computer communication networks

The public health system is at risk for being left behind technologically. The health care sector is progressing toward a foundation of interoperable information technology under the Meaningful Use incentive program. As a result of electronic health record (EHR) adoption, the use of information and data sharing capabilities will dramatically increase for numerous health care providers. The potential benefit to public health is a justification for the incentive program, and providers will have to report selected data to public health

agencies to demonstrate their meaningful use (Centers for Medicare and Medicaid Services 2011a,b). While data and information capacity are increasing in the health care system, no parallel federal funding mechanism exists for ensuring the same capacities in the public health system (Lenert and Sundwall 2012). Furthermore, little research sheds light on the extent to which the public health community is even ready or capable of being connected to other organizations' information technology and systems (IT/IS).

This study provides a look at that situation by examining what factors contribute to public health organizations' data exchange capabilities. Understanding how organizations within the public health system share data with each other can guide efforts to improve data exchange within, across, and beyond the public health system. Using secondary datasets, the breadth and depth of the IT/IS issues emerge that must be addressed to connect the health care system with the public health community.

BACKGROUND

Public health is a data-intensive endeavor. Data are necessary to perform disease surveillance, community planning, organizational decision making, and deliver health care and preventive services. However, each public health agency cannot independently gather all the data it needs to support these efforts. Within the public health sector, overlapping jurisdictions and mobile populations require state health agencies (SHA) or local health departments (LHD) to exchange data to have a complete picture of the health of the communities they serve. For example, cases of communicable diseases may be investigated by LHD staff members, but data on that case must be shared with the SHA to obtain unduplicated counts of cases for their own jurisdiction and for the entire state. Likewise, for immunization programs to be effective, public health practitioners need to be aware of vaccinations delivered in other jurisdictions (Linkins and Feikema 1998). Without sufficient IT/IS capabilities to facilitate the sharing of data, agencies cannot plan effectively, respond timely, or operate efficiently (Mahon et al. 2008; Papadouka, Metroka, and Zucker 2011).

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Ideally, IT/IS would enable reciprocal data exchange: akin to a two-actor network with the joint IT/IS capabilities defining a dyad's tie. SHA and LHD use of interoperable IS would enable seamless, efficient sharing of data. Interoperable systems have a uniform presentation and structure of data as well as standards that preserve the meaning and usability of data. However, that capability is not the norm in public health: often agencies manage data in a noninteroperable format (e.g., paper records) or use IS unsuitable for efficient and effective data sharing (e.g., spreadsheets) (National Association of County and City Health Officials [NACCHO], 2011; Turning Point National Excellence Collaborative for Information Technology 2005). As a result, data sharing gaps exist between organizations, or returning to the dyad illustration, the tie is removed. An obvious type of data sharing gap results from the absence of any data sharing capabilities between the two organizations. However, gaps in data sharing could occur when one member of a dyad does not utilize an interoperable IS as the flow of data is negatively affected, limited, or even prohibited.

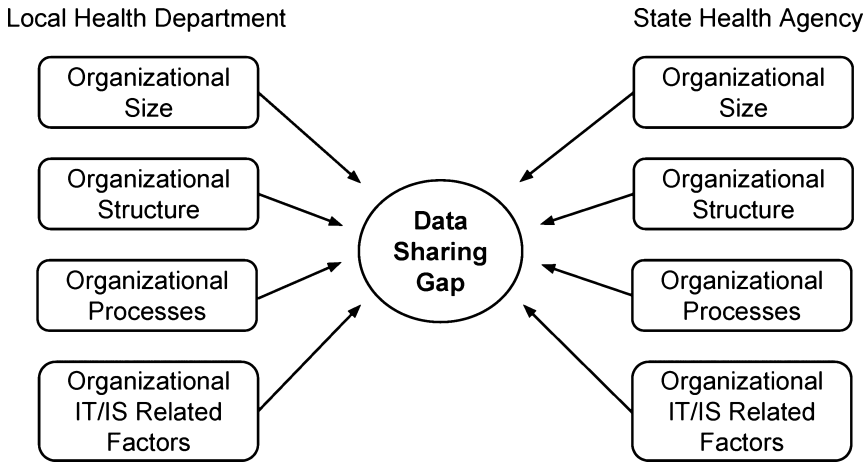
The absence of reciprocal data sharing capabilities between organizations constitutes a structural barrier to the effective functioning of the public health system. The objective of this study is to identify the organizational factors associated with data sharing capability between SHAs and LHDs for the following key public health activities: childhood immunizations, vital records, and reportable conditions. We selected these three activities as they are common among LHDs, cover different programmatic areas, and are historically public health activities.

Conceptual Framework

Specific characteristics of the LHD and the SHA contribute to the possibility of successful data exchange, thus influencing the extent of a data sharing gap (Figure 1). The model describes categories of factors likely to influence the ability of either the LHD or the SHA to gather, provide, or receive data. We focus on the roles of four categories of factors from the management, IS, and public health literature: organizational structure, organizational process, IT/IS factors, and size.

In public health research considerable attention has focused on the relevance of the organizational structure of the LHD–SHA relationship: authority centralized in the SHA, decentralized to the LHD, or a hybrid of the two. Under a centralized arrangement each LHD is essentially a functional unit of

Figure 1: Categories of Factors Influencing the Development of Information Sharing Gaps



the SHA. Centralization may reduce data gaps by coordinating IS decision authority (Sambamurthy and Zmud 1999) and through institutional and resource power (Baum et al. 2011). Generally, centralized governance is associated with more use of public health IS (Vest, Menachemi, and Ford 2012).

In addition, organizational processes can stimulate the development of IT/IS capabilities. The processes of planning (Lenihan 2005) and making sense of the environment (Choo 2006) indicate a need for information. In such circumstances, information reliance has the potential to stimulate data sharing, thereby reducing the possibility of a data gap. In addition, organizations may create linkages with academic institutions to introduce innovations (Conte et al. 2006). Collaborations may highlight the need to use IT/IS capable of meeting data sharing needs or help provide the internal resources to better evaluate IT/IS offerings.

We explored two IT/IS infrastructure categories: governance and readiness. Governance refers to the rights, authority, and control over IT/IS decisions within the organization. High organizational autonomy over IT/IS decisions tends to increase data sharing difficulties (Arzt et al. 2011). Readiness reflects an organization's entire IT/IS capabilities in terms of infrastructure, existing applications, and staff skill to adopt technology (Zhu, Kraemer, and Xu 2006). A higher level of readiness ought to contribute to more data sharing.

Organizational size is well understood as a key variable associated with many health care practices and outcomes. Similarly, the challenge posed by increasing the number of data sources to integrate, or system distribution (Hasselbring 2000), may increase the likelihood of a data sharing gap (Vest, Kirk, and Issel 2012).

METHODS

Design and Data Source

We combined two organizational surveys. NACCHO's 2008 National Profile of Local Health Departments survey (Profile Survey) described LHD's organization, structure, and capabilities. The survey was sent to the executive officer or designee of all U.S. LHDs. In addition to core questions, a subset of LHDs was also surveyed about IT/IS capabilities. The Association of State and Territorial Health Official's 2007 Profile of State Public Health Survey (Association of State and Territorial Health Officials (ASTHO) 2010a) described the organization, financing, and activities of each SHA. Respondents, generally state health officials, completed the survey.

Sample

The Profile Survey response rate was 87 percent, and 473 LHDs were administered the IT/IS questions (NACCHO 2009). All 50 states responded to the ASTHO survey. The LHDs included in the sample were from 44 states.

Dependent Variables

Analyses were limited to data sharing capabilities for the activities of childhood immunizations, vital records, and reportable conditions. For each activity, we created a binary variable that measured whether bidirectional data sharing was structurally possible between an LHD and their respective SHA (Vest and Issel 2013). Bidirectional data sharing existed if the LHD reported maintaining records on a shared database and the SHA reported using a database that could send data to other organizations. Lack of bidirectional data sharing (a gap) existed if the LHD reported maintaining records using paper, spreadsheets, or only local databases or if the SHA did not use an electronic database or that database could not send data. We limited classification of bidi-

rectional data sharing capabilities to instances where the LHD and SHA reported responsibility for the activity.

Independent Variables

LHD-level variables were derived from the Profile Survey. Organizational size was captured by population size served, number of employees, and total revenues. Two variables reflected LHD organizational structure: jurisdiction and governance. Organizational processes were measured as extent of academic linkages and agency-wide strategic planning in the past 3 years. We measured IT/IS readiness as the presence of IT staff, number of IT/IS in use (EHR, health information exchange, field IT hardware, and wireless networks), and awareness of national IS standards. To describe LHD IT/IS autonomy, we created a three-level categorical variable based on the entity identified as responsible for the LHD's hardware, software, data management, and security decisions.

At the state level, we attempted to match the constructs using the ASTHO survey. Two variables indicate SHA organizational size: number of employees and the number of LHDs within the state. Organizational structure was captured through two variables: centralization and whether the SHA was freestanding or under an umbrella organization. Centralization was defined by the State and Local Health Department Governance Classification System (ASTHO 2010b). No relevant or matching organizational process variables were available. Lastly, we measured SHA IT/IS readiness as the total number of IS reported in use (range = 0–14).

Analysis

We used multilevel logistic regression models with the strata as random intercepts (Rabe-Hesketh and Skrondal 2006) to describe the association between variables and presence of a data sharing gap. The Profile Survey included sampling weights to account for nonresponse bias and to provide nationwide estimates, which we rescaled (Carle 2009). Models were fit using GLLAMM (Rabe-Hesketh and Skrondal 2008) with robust standard errors to account for within state clustering. To adjust for confounding, we built best fitting regression models using a backward elimination approach looking for improvements in information criterion measures while remaining attentive to changes in the overall sample size and potential colinearity. We created adjusted models for each activity. Significance testing was set at the $\rho = .05$ level, but due to

the number of public health activities considered, we applied the Šidák–Holm correction to the ρ values from each adjusted models (UCLA: Academic Technology Services 2012).

RESULTS

The majority of LHDs had a local jurisdiction (91.3 percent) and were components of local government (76.9 percent) (Table 1). The sample included a large percentage of LHDs that served small populations (42.3 percent). Decentralized (43.2 percent) and hybrid (40.9 percent) were the most common governance structures (Table 2). SHAs averaged 9.4 total number of IS in use. Most states (53.3 percent) included fewer than 50 LHDs.

The percentages of LHD–SHA sharing arrangements that were gaps in IT/IS capabilities, that is, without bidirectional data sharing, varied by activity (Table 3). In the case of immunizations, 34.0 percent of all dyads were gaps. Based on the jurisdiction population, this translates to more than 20 million individuals living in areas served by an LHD with a gap in immunization sharing. The occurrence of a gap was much more common for vital records (69.8 percent) and reportable conditions (81.1 percent). Again, these translated into nearly 21 million and 48 million people in public health jurisdictions with data sharing gaps, respectively.

After adjusting for confounding, six factors were significantly associated with gaps in data sharing capabilities for childhood immunizations (Table 4). A local jurisdiction LHD had a higher odds of a gap compared with those with a district jurisdiction (OR = 1.88; 95 percent CI = 1.19, 2.97). The odds of a gap were lower when the LHD was locally governed (OR = 0.35; 95 percent CI = 0.38, 0.66) and was not serving an urban area (57 percent lower for micropolitan areas and 62 percent lower for rural areas). At the state level, the number of IS in use was negatively associated with gaps (OR = 0.75; 95 percent CI = 0.66, 0.85) and the number of LHDs in the state continued to be positively associated with gaps (OR = 1.01; 95 percent CI = 1.01, 1.02).

In the adjusted model, only two factors were associated with the presence of a gap in the ability to share vital records (Table 4). LHDs that served larger populations had lower odds of a gap (OR = 0.33; 95 percent CI = 0.20, 0.53). The more IS in use at the SHA, the lower the odds of a gap (OR = 0.46; 95 percent CI = 0.37, 0.57).

After adjustment, numerous factors were associated with gaps in the IT/IS capabilities for sharing reportable conditions (Table 4). For one, the more

Table 1: Organizational Characteristics of Local Health Departments (LHDs) Examined for Data Sharing Gaps with Their State Health Agency (n = 473)*

Organizational Size	*n*	*% (weighted) or Mean (SD)*
Size of population served		
<25,000	141	42.3
25,000–99,999	177	36.0
100,000–499,999	115	16.9
≥500,000	40	4.7
Geographical type		
Urban	247	44.6
Micropolitan area	76	15.1
Small town/rural	150	40.3
No. of employees, mean (SD)	448	72.5 (925.8)
Annual revenues in millions, mean (SD)	428	6.8 (129.8)
Organizational structure		
Jurisdiction type		
Local (city, county, city/county)	421	91.3
District/multicounty	52	8.7
Governance type		
State government	113	23.1
Local government	360	76.9
Organizational processes		
Academic linkage types		
LHD staff on faculty	190	32.6
Academics on LHD advisory board	111	19.4
LHD staff on academic advisory board	134	22.8
Completed strategic planning	244	48.1
Organizational IT/IS factors		
IT/IS readiness		
Has IS staff	135	20.9
Number of types of IT implemented (mean, SD)	464	1.1 (2.7)
IS standard awareness (mean, SD)	453	1.7 (2.4)
IT/IS autonomy		
State authority for all IT/IS	61	13.6
LHD authority for all IT/IS	187	38.2
Mixed/other authority	225	48.3

*Data from the NACCHO 2008 Profile.

IS in use at the state the lower the odds of a gap (OR = 0.40; 95 percent CI = 0.35, 0.45). In addition, the odds of a gap were higher as the number of LHDs in the state increased (OR = 1.01; 95 percent CI = 1.01, 1.02). At the local level, the odds of a gap were 12 times higher for locally governed LHDs (OR = 11.75; 95 percent CI = 3.57, 38.61) and statistically higher for those that had undertaken strategic planning (OR = 2.31; 95 percent CI = 1.22,

Table 2: Characteristics of State Health Agencies Examined for Data Sharing Gaps with Their Respective Local Health Departments (LHDs) ($n = 44$)*,†,‡

Organizational Size	*n*	*% or Mean (SD)*
Number of employees (mean, SD)	41	2,279.5 (2,910.1)
Number of LHDs in the state		
≤50	23	53.3
51–75	9	20.5
>75	12	27.3
Organizational structure		
Stand-alone agency	25	56.8
State–local governance structure		
Centralized with state	7	15.9
Decentralized to locals	19	43.2
Hybrid	18	40.9
Organizational IT/IS factors		
IT/IS readiness		
Number of IS in use (mean, SD)	44	9.4 (2.7)

*Data from the 2007 ASTHO Survey.
†Number is less than 50 because states without LHDs were excluded from the analysis and only states with LHDs answering NACCHO's IT/IS questions are included.
‡Data sharing gap defined as the absence of the organizational IT/IS capacity to engage in bidirectional data sharing between and LHD and SHA.

Table 3: Distribution of Local Health Department—State Health Agency Dyads ($n = 473$) with Bidirectional Data Sharing Capability

	No Bidirectional Sharing (Gap)		*Yes Bidirectional Sharing (no Gap)*	
	n	*% (weighted)*	*n*	*% (weighted)*
Immunizations (childhood)	135	34.0	260	66.0
Vital records	181	69.8	94	30.2
Reportable conditions	340	81.1	94	18.9

4.35). The odds of a gap were 43 percent lower for micropolitan area LHDs compared with urban LHDs.

Limitations

Our secondary data sources resulted in several constraints. First, we could only explore factors derivable from the surveys, so factors like data quality or

Table 4: Factors-Associated Gaps in Data Sharing for Child Immunizations, Vital Records, and Reportable Conditions[†]

	Childhood Immunizations		*Vital Records*		*Reportable Conditions*	
	Unadjusted OR (95% CI)[‡] *n = 395*	*Adjusted OR (95% CI) n = 395*	*Unadjusted OR (95% CI) n = 275*	*Adjusted OR (95% CI) n = 275*	*Unadjusted OR (95% CI) n = 434*	*Adjusted OR (95% CI) n = 434*
Local health department size						
Population served (standardized)	0.78 (0.64, 0.94)**	0.59 (0.36, 0.97)	0.31 (0.21, 0.46)***	0.33 (0.20, 0.53)***	0.66 (0.46, 0.93)*	0.96 (0.85, 1.08)
Micropolitan area versus urban	0.48 (0.27, 0.86)*	0.43 (0.28, 0.66)***	1.29 (0.82, 2.05)		0.82 (0.50, 1.33)	0.57 (0.42, 0.77)**
Small town/rural versus urban	0.24 (0.10, 0.59)**	0.22 (0.10, 0.46)***	1.40 (0.56, 3.53)		1.23 (0.69, 2.21)	1.41 (0.92, 2.15)
Number of employees (standardized)	0.41 (0.17, 0.99)*		0.67 (0.05, 8.97)		0.14 (0.06, 0.33)***	
Annual revenues (standardized)	0.36 (0.07, 1.86)		0.20 (0.07, 0.58)**		0.10 (0.03, 0.29)***	
Local health department structure						
Local (city/county) versus district jurisdiction	1.42 (0.68, 2.97)	1.88 (1.19, 2.97)*	0.51 (0.22, 1.17)		0.51 (0.23, 1.13)	
Local versus state governance	0.55 (0.29, 1.05)	0.38 (0.22, 0.66)**	1.71 (0.69, 4.28)	0.75 (0.27, 2.02)	5.97 (2.90, 12.29)***	11.75 (3.57, 38.61)***

Continued

Table 4. *Continued*

	Childhood Immunizations		*Vital Records*		*Reportable Conditions*	
	Unadjusted OR (95% CI)[‡] *n = 395*	*Adjusted OR (95% CI) n = 395*	*Unadjusted OR (95% CI) n = 275*	*Adjusted OR (95% CI) n = 275*	*Unadjusted OR (95% CI) n = 434*	*Adjusted OR (95% CI) n = 434*
Local health department processes						
Academic linkages	1.57 (0.84, 2.92)		0.88 (0.45, 1.70)		0.50 (0.27, 0.92)*	0.28 (0.15, 0.53)***
Completed strategic planning	0.94 (0.86, 1.02)	0.60 (0.36, 0.99)	1.06 (0.99, 1.13)		0.97 (0.94, 0.99)**	2.31 (1.22, 4.35)*
Local health department IT/IS factors						
IS staff	0.58 (0.23, 1.41)		0.31 (0.16, 0.61)**		0.26 (0.12, 0.54)***	
Number of types of IT implemented	0.83 (0.67, 1.03)		0.87 (0.71, 1.07)		1.08 (0.81, 1.45)	
IS standard awareness	0.40 (0.15, 1.06)		0.51 (0.16, 1.57)		0.71 (0.24, 2.14)	
IT/IS autonomy						
LHD authority for all versus state	0.45 (0.27, 0.77)**		0.50 (0.16, 1.54)		1.43 (0.55, 3.68)	

Continued

Table 4. *Continued*

	Childhood Immunizations		*Vital Records*		*Reportable Conditions*	
	Unadjusted OR (95% CI)[‡] *n = 395*	*Adjusted OR (95% CI) n = 395*	*Unadjusted OR (95% CI) n = 275*	*Adjusted OR (95% CI) n = 275*	*Unadjusted OR (95% CI) n = 434*	*Adjusted OR (95% CI) n = 434*
Mixed/other authority versus state	0.59 (0.32, 1.08)		0.39 (0.15, 1.01)		0.96 (0.50, 1.87)	
State health agency size						
Number of employees (standardized)	0.64 (0.52, 0.79)***		0.50 (0.42, 0.59)***		0.28 (0.14, 0.53)***	
Number of LHDs in state	1.01 (1.00, 1.01)*	1.01 (1.01, 1.02)***	1.00 (0.99, 1.02)		1.02 (1.00, 1.03)	1.01 (1.01, 1.02)***
State health agency structure						
Stand-alone agency	3.26 (2.28, 4.66)***		0.25 (0.17, 0.38)***		1.32 (0.75, 2.32)	
Centralization						
Centralized	1.00		1.00		1.00	
Decentralized	1.32 (0.56, 3.12)		1.99 (0.68, 5.88)		7.90 (2.64, 23.58)***	
Hybrid	1.21 (0.60, 2.45)		0.68 (0.29, 1.60)		0.93 (0.40, 2.94)	
State health agency IT/IS factor						
Number of types of IS in use	0.81 (0.73, 0.89)***	0.75 (0.66, 0.85)***	0.46 (0.41, 0.52)***	0.46 (0.37, 0.57)***	0.44 (0.35, 0.55)***	0.40 (0.35, 0.45)***

[†]Gaps defined as the absence of bidirectional data sharing capability.
[‡]Odds ratio and 95% confidence interval.
*$p < .05$, **$p < .01$, and ***$p < .001$ (in the adjusted models, p-values are corrected p-values).

users' perceptions are absent. Importantly, our definition of a data sharing gap is a structural capacity measure; we did not measure actual usage. Undoubtedly, data move between agencies by noninteroperable IS, paper, and/or telephone. However, IS are more efficient and effective than paper systems (Bartlett et al. 2007), and telephonic communications are devoid of the organizational learning capabilities afforded by using IS to aggregate data. Also, this analysis's 2007/2008 survey data may not reflect the current state of data sharing, but recent surveys did not include IT/IS capability items. LHDs' IT/IS capabilities appear not to have shifted dramatically (NACCHO 2011), so our findings are probably closer to reality than we would like.

In addition, this study did not examine laboratory sharing or syndromic surveillance, which may be examples of more successful public health data sharing. However, as those activities rely heavily on national laboratories and local health systems, the interorganizational dynamic is different from the LHD–SHA relationship examined here.

Discussion

This study documents the troubling situation in which a large proportion of LHDs do not have the IT/IS capabilities to engage in true bidirectional data sharing with their SHA. The incomplete capacity to electronically share data poses potential problems for public and population health, especially given that millions of Americans live in jurisdictions with suboptimal data sharing arrangements. The challenges of ineffective public health data sharing inhibit effective strategic planning, create inefficiencies, and duplicate services (Vest et al. 2013).

Furthermore, this situation calls into question the ability of public health entities to acquire and utilize the enormous amount of data being generated by the rapid transformation of the health care system. Due to the widespread adoption of EHRs under the Meaningful Use incentive program, now more than half of U.S. hospitals can electronically share population and public health measures (Charles et al. 2013). Also, the new organizational forms so important to current trends in health care delivery, like health information exchange organizations, patient-center medical homes, and accountable care organizations, rely heavily on IT/IS. As the number of these technologically transformed health care organizations continues to increase, many public health entities may not be ready to exchange data, let alone do so efficiently (Lenert and Sundwall 2012). EHRs can provide a wealth of data for public

health purposes, but only if public health agencies possess sufficient capability to acquire and use that data (Klompas et al. 2012). In such an environment, public health entities that are not ready to exchange data with health care organizations are at a disadvantage for serving for their population. Agencies without sufficient technical capabilities will have an incomplete profile of their local population and risk becoming irrelevant to local and state planning discussions.

Implications

The study results suggest several actions that public health, states, and the federal government could take to strengthen the public health IT/IS infrastructure.

First, smaller agencies were at greater risk for gaps in IT/IS capabilities. In addition to the other potential benefits, smaller LHDs and adjacent LHDs ought to consider regionalization as an approach to increase technological capacity. Regionalization, a current trend where LHDs form collaborative relationships to share resources or deliver services, has the potential to gain the infrastructure and resource advantages created by larger size (Soto 2008; Libbey and Miyahar 2011). Formal interorganizational relationships between adjacent jurisdictions may be politically difficult but would eliminate duplicative efforts by LHDs and reduce the number of systems to which SHAs would have to connect. Formal investigations on the effectiveness of regionalization could investigate whether IT/IS economies of scale were realized and beneficial.

Second, as the dominant actor in all public health data sharing relationships, the SHA is a clear intervention point. For public health, state-supplied or developed IS provide logical advantages, on being that questions of interoperability are immediately resolved by an enterprise IS. Also, given that the forms and questionnaires used to provide immunizations, record vital events, or report notifiable conditions are relatively standardized within states, an enterprise IS would match most of the data collection needs for essentially any LHD within the state. For this to be an effective approach, questions of IS quality and policies around usage and data access would obviously have to be addressed concurrently.

Conceptually, the states ought to lead on improving the public health IT/IS infrastructure. The inconsistent and decreasing investment in public health suggest variance in the ability or willingness of states to invest in the system (Trust for America's Health's 2013). As a substantial portion of SHA's

budgets come from federal sources (ASTHO 2011), federal action drives much of state health policy. Key agencies, like the Centers for Disease Control and Prevention (CDC), could lead efforts to improve the public health IT/IS infrastructure through institutional and resource powers. For example, the CDC could require the broad adoption of data standards created by efforts like Public Health Data Standards Consortium. Such institutional power has been used to define functional standards for public health (CDC 2013), but it could be extended to data standards and benefit of making data comparable across states.

The differences in the prevalence of data sharing gaps between the activities investigated illustrate the problematic nature of public health finance. Overall, the United States invests minimally in public health and existing funding is fragmented, following programmatic lines. Consequently, the resources available to public health agencies are constrained to particular programs, diseases, or activities (Committee on Public Health Strategies to Improve Health 2012). This "siloed" funding likely affects infrastructure investments, leading to nonuniform IT/IS across programs and agencies with different funding limitations. The fact that the lowest prevalence of gaps occurred for childhood immunizations may reflect the sustained national priority and investment in state Immunization Information Systems (Rasulnia and Kelly 2005). In contrast, other priorities, such as syndromic surveillance and laboratory capacity, although important, do not seem to have translated into organizational learning about interoperable IT/IS which would benefit other public health activities. Public health organizations must be included in federal priorities and funding must address improved IT/IS for public health. While state-level financing reforms would be important, public health's dependence on federal funding demands federal finance reform.

The current Meaningful Use program does not meet that need of reformed public health financing. While public health agencies can be eligible for Meaningful Use incentive payments, many do not provide clinical services and therefore will not be eligible for any funding. Furthermore, receiving Meaningful Use incentive payments does not change the fragmented nature of funding for their other critical IT/IS. Broader and more flexible financial support would supplement funding by local and state governments but also reinforce the value of public health data in the overall national portrait of the health of the nation. If the nation's aims of improved health for the population through health IT are to be realized, then public health IT/IS infrastructure needs to be sufficiently equipped to support that effort.

Conclusions

The gaps in data sharing capabilities of public health organizations do not bode well for effective data sharing with the health care system. The potential public health benefits are one of the justifications for the unprecedented federal investments in EHR adoption and information exchange. However, if public health agencies do not solve their own data sharing challenges, they will be ill prepared to manage and leverage the soon-to-be-available electronic health care data. Several factors associated with data sharing gaps are amenable to change through either administrative decisions or policy interventions. Improving the IT/IS capabilities of LHDs and SHAs may be the key to their remaining relevant in the currently evolving health care system.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.